European Society of Hypertension

Scientific Newsletter
Update on Hypertension Management

2019, 20, nr. 71

CARDIOVASCULAR RISK IN ETHNIC MINORITIES AND DISADVANTAGED POPULATIONS IN EUROPE

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Immigration is now a central topic in the European political agenda. However, the focus remains limited to asylum seekers, while health inequalities concerning people born outside the European Union (EU) but living and working in Europe for many years are only marginally considered. The presence of these new patients in the office of physicians has sharply increased in recent decades. In most EU Countries, physicians are not fully aware of differences existing across ethnic groups in terms of their burden of cardiovascular risk factors and established cardiovascular diseases (CVD). Most importantly, growing evidence indicate that currently adopted instruments for cardiovascular risk estimation for ethnic minorities are not adequate for tailored preventive interventions, targeted screening programs, and allocation of sufficient resources [1]. When approaching ethnic minorities these points have indeed to be considered.

Cardiovascular risk assessment: from global to local perspectives

In 1994 the European Society of Hypertension with the European Society of Cardiology and the European Atherosclerosis Society, firstly issued a risk-assessment chart and a definition of high risk, based on equations developed from Framingham Heart Study data, to deliver strategies for hypertension management [2]. Since then, several organizations and countries started issuing risk-based guidelines for clinical approach to hypertension treatment. Well-known risk estimation models are the Framingham general CVD equation developed in the United States (US) [3], the Systematic Coronary Risk Evaluation (SCORE) model developed in EU [4], the QRISK in the United Kingdom (UK) [5], and the most recent Pooled Cohort Equations (PCEs) for atherosclerotic CVD (ASCVD) now adopted in the American College of Cardiology/American Heart Association guideline [6].

All these equations were however derived from Western population cohorts, so that their applicability to other populations is questionable [7, 8]. The mathematical basis of a CVD risk-assessment model indeed mainly relies on three elements that may differ between different population cohorts: 1) the mean levels or prevalence of risk factors, 2) the average absolute CVD risk (incidence or mortality), and 3) the relative risk (or hazard ratio) that is the factor of risk increase (e^{β}) when risk factor is increased by one unit [8]. In recent years differences in the first two elements, mean risk-factor levels [9, 10] and mean rates of CVD [11-13], between native Europeans and ethnic minorities have been shown. As regard the third element, a steeper association of blood pressure with stroke among Asians than among EU populations was early observed in the Asia Pacific Cohort Studies Collaboration study [14]. This pattern was recently confirmed in a cohort of South Asians (SA) living in UK [15]. On these bases it is clear that a systematic underestimation or overestimation of cardiovascular risk can be expected if a model derived from one population cohort (US or EU) is applied to patients in low income countries to EU ethnic minorities. Unsurprisingly, the Framingham, and SCORE cardiovascular risk prediction models did not accurately predict an excess risk in minority ethnic groups in UK [16].

One pragmatic and advocated solution to the need to base clinical decisions on risk prediction in ethnic minorities is to use equations derived from studies on white Europeans (SCORE) but to multiply the result by correction factors to account for the mismatch between expected and actual prediction (1.4 for Southern Asia; 1.3 for Sub-Saharan Africa, and the Caribbean; 1.2 for Western Asia; 0.9 for Northern Africa; 0.7 for Eastern Asia or South America) [17]. This is conceptually equivalent to using a different threshold of predicted risk. However, even this correction can be improper because ethnicity cannot be confined in single homogenous risk classes. In fact, differences in the prevalence of risk factors have been highlighted within the South East Asian population living in Europe [9], and within China itself [18]. Hypertension prevalence and stroke incidence show large geographical variations in China being higher in the North than in the South of the country [18] and the regional pattern of eating habits (i.e.sodium consumption), hypertension and diabetes prevalence seem to be maintained after migration [1]. Covariates such as geographic region and urbanization have been included in the China-PAR (Prediction for ASCVD Risk in China) equation in addition to classic factors age, SBP, total cholesterol, HDL-C, current smoking, and diabetes [19]. The equation, which was developed in the China-PAR project by using InterASIA (International Collaborative Study of Cardiovascular Disease in Asia) and China MUCA (China Multi-Center Collaborative Study of Cardiovascular Epidemiology), showed good ability to predict 10-year ASCVD risk among Chinese population [19]. Conversely, the pooled cohort equation, derived from US populations, showed a higher calibration ($\chi 2$) in men when compared with the China-PAR equation in a Chinese external validation cohort [19] (118.8 versus 31.7). It is now time to consider the enormous extension of the country and the diversity of CV risk between populations living in the different areas of China when we deal with Chinese migration. When considering how frail are the current basis for total CVD risk estimation for most ethnic minorities, special attention to main risk factors should be played.

Risk factors included in guidelines for risk assessment

In 2017 according to the Global Burden of Diseases (GBD) comparative risk assessment [20], 34.1 million deaths and 1.21 billion Disability-Adjusted Life Years (DALYs) were attributable to GBD risk factors (61.0% of deaths and 48·3% of DALYs). High systolic blood pressure (SBP) was the leading risk factor, accounting for 10.4 million deaths and 218 million DALYs, followed by high fasting plasma glucose (6.53 million deaths and 171 million), and high body-mass index (BMI; 4.72 million deaths and 148 million DALYs) [20]. Even with many favourable changes in people's lifestyles, the incidence and prevalence of hypertension and diabetes mellitus have been found consistently higher among ethnic minorities than among native EU populations. Furthermore, patients belonging to ethnic minorities in EU are mostly undiagnosed, untreated, or uncontrolled. The area of origin and the socio-economic status seem to remain a proxy for health needs.

Sub-Saharan Africans and hypertension

Although between countries heterogeneities exist in terms of language, diet, and religious practices [17] the common term of Sub Saharan Africans (SSA) is often adopted. According to a recent systematic review and meta-analysis of 23 observational studies conducted in Europe up to 2015 including a total of 9,070 SSA (3,894 men and 5,176 women), and 130,380 EU (67,768 men and 65,612 women, the absolute differences in BP between the adult population originating from SSA or EU Countries were 3.38 mmHg and 3.29 mmHg for SBP and diastolic blood pressure (DBP) respectively [9]. Consistent with raised BP levels, an excess risk of stroke and renal

disease was observed for SSA in different EU countries [11-13]. When considering out-of-office BP measurement, SSA were consistently reported to have high night-time BP and the percent fall in systolic BP from daytime to night-time, higher in EU than SSA, remained significant when corrected for resting systolic BP. A smaller nocturnal decline in ambulatory BP was observed in SSA when compared with EU so that ambulatory BP monitoring (ABPM) might be especially useful in this ethnic group [7, 12].

Hypertension burden in SSA is highly modifiable with adaptations to guest environments, mainly related to changes in salt intake and lifestyle. In recent decades, Scientific Societies have therefore tried to specifically support the reduction of dietary sodium among SSA, but BP level differences between SSA and EU has remained substantial over the years [9]. Probably these strategies encounter obstacles. The perceptions of SSA patients on the onset, symptoms, pathophysiology, course and treatment of hypertension may differ substantially from those of their health care workers, with an impact on adherence to treatment. Reconciliation of patient-provider differences can improve adherence and acceptance of medical care among African patients.

South Asians and type 2 diabetes

An early systematic review showed that hypertension prevalence was lower in Bangladeshis followed by Pakistanis and Indians, than in EU [21]. When absolute BP values were considered SA, taken as a whole group, had SBP values lower than EU (-4.57 mmHg) [9]. This finding apparently does not fit with the consistently reported higher incidence of CV events in SA living in Europe as compared with native EU. However, the prevalence of type 2 diabetes mellitus was uniformly higher in SA than in EU in surveys [9,10]. More precisely SA had the highest odds ratio for diabetes (OR=3.9), followed by subjects originating from Middle East and North Africa (OR=2.7), Sub-Saharan Africa (OR = 2.6), Western Pacific area (OR=2.3) and South and Central America (OR=1.3) [10]. The causes for the disproportionate burden of diabetes among ethnic minority groups are unclear but are thought to be a complex interplay between environmental factors and genetic factors. Main evidence are that 1) the age of onset is generally lower in these populations compared to EU; 2) notwithstanding a comparable mean body mass index, SA have increased abdominal visceral fat and greater insulin resistance than EU [12]; 3) SA have also been reported to be less physically active compared to other ethnic minority groups and to EU.

In light of defining the best prevention strategies, the control of body weight in ethnic minorities is to be specially encouraged because of its relationship with diabetes. Finally, it might be important to consider the role of religion in culturally-specific strategies for CV prevention because the lowest blood pressure values within the SA group were observed in studies that enrolled subjects originating from Muslim countries [9].

The issue of Chinese migrants

In the last two decades stroke rates declined in most high-income and increased in low and middle-income countries [1]. For the Chinese population, and especially for the inhabitants of rural areas, stroke is more common than coronary heart disease [18, 20]. Moreover, unlike what is observed in Western countries where vascular lesions are mainly located in the carotid district, 46% -51% of Chinese patients admitted for TIA or acute stroke have an intracranial stenosis [1]. Associated risk factors such as hypertension, diabetes, dyslipidaemia and cigarette smoking are common, while the prevalence of atrial fibrillation appears lower than in the EU. Thus, aggressive control of vascular risk factors and lifestyle modification are essential to prevent ischemic stroke. In China, where a high prevalence of hypertension has been consistently reported [18], the prevalence of diabetes in the general population rose from 1% in 1980 to 11% in 2013 [1]. Conversely, Chinese immigrants living in Europe are still traditionally considered to be at low cardiovascular risk. In the absence of mortality data of Chinese cohorts in EU, this position was probably supported from early surveys performed in UK where a favourable pattern of diabetes and other risk factors was observed. In a more recent nationwide survey in the UK, a low rate of diabetes was also found, although only self-reported diabetes was considered (3.8% in men, 3.3% in women) [22]. Furthermore, Chinese people investigated in the above studies were mainly born in the UK. This point is probably crucial because socioeconomic difficulties, and barriers in the access to healthcare systems are mainly experienced by first-generation migrants. Differently from what observed in UK, the large majority of Chinese living in the South of Europe is represented by first generation migrants who were born in China, mainly in rural areas of the South East regions of China (Zhejiang and Fujian). In a recent survey (CHIP), the prevalence of diabetes among these first-generation Chinese migrants settled in Italy was almost two times higher than among native Italian population being similar to values currently detected in China (diabetes 11%). Among these first-generation migrants, only the capability to speak Italian was associated with years spent in the host Country, whereas hypertension and other risk factors were not [23, 24]. When considering the age group 35 to 59 years, Chinese had higher hypertension prevalence than Italians (27.2% vs 21.3%, $p<0.01$), with comparable levels of awareness (57.4% and 48.4%), although lower treatment rates (70.6% and 90.0% respectively) [1]. However, the rate of BP control did not differ between the two groups being 42% and 44% respectively [1]. Importantly, 1) the opportunity to be allocated to hypertension treatment was not promoted from being entitled to healthcare insurance [23]; 2) second, hypertension awareness was not a guide to reduce sodium consumption; 3) third, sodium excretion and hypertension prevalence were unaffected by or years of residence in Italy [25]. In conclusion, first-generation Chinese immigrants do not easily assimilate Western (Italian) lifestyle and health promotion among this ethnic minority requires specific approaches.

Prevention programs addressed to resident population might be inefficient for ethnic minorities. Equal provision of care, with the removal of administrative burden limiting the access to health services to undocumented migrants, might be insufficient to reduce hypertension burden in the absence of specific information programs.

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